



#5/43

SEQUENCE LISTING

<110> Dalemans, Wilfried L.J.
Gerard, Catherine Marie Ghislaine

<120> Vaccine

<130> B45124

<140> 09/581,976

<141> 2000-06-20

<150> PCT/EP98/08563

<151> 1998-12-18

<150> GB 9727262.9

<151> 1997-12-24

<160> 26

<170> FastSEQ for Windows Version 3.0

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<211> 220

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
16)

<400> 1

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1				5				10					15		
Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
			35				40					45			
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
			50				55					60			

Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65					70					75					80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
				85					90					95	
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met	Leu	Asp	Leu
	115						120					125			
Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys	Tyr	Glu	Gln	Leu	Asn	Asp	Ser
130						135					140				
Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln	Ala	Glu	Pro
145				150					155					160	
Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys	Cys	Asp	Ser
			165					170						175	
Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile	Arg	Thr	Leu
		180						185					190		
Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro	Ile	Cys	Ser
	195						200					205			
Gln	Lys	Pro	Thr	Ser	Gly	His	His	His	His	His	His				
210						215						220			

<210> 2

<211> 663

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
16)

<400> 2

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attattgctc accgtgggtgc tagcgggtat ttaccagagc atacgttaga atctaaagca	120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt	180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc	240
ccacatcgtc atcgtaaaga tggcggttac tatgtcatcg actttacctt aaaagaaatt	300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca	360
ttgcatgaat atatgttaga ttgcaacca gagacaactg atctctactg ttatgagcaa	420
ttaaatgaca gtcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg	480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg	540
tgcgtacaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta	600
ggaattgtgt gcccacatctg ttctcagaaa ccaactagtg gccatcatca ccataccat	660

<210> 3

<211> 822

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

<400> 3

ATGGATCCAA	GCAGCCATTC	ATCAAATATG	GCGAATACCC	AAATGAAATC	AGACAAAATC	60
ATTATTGCTC	ACCGTGGTGC	TAGCGGTTAT	TTACCAGAGC	ATACGTTAGA	ATCTAAAGCA	120
CTTGCGTTTG	CACAACAGGC	TGATTATTTA	GAGCAAGATT	TAGCAATGAC	TAAGGATGGT	180
CGTTTAGTGG	TTATTCACGA	TCACTTTTTA	GATGGCTTGA	CTGATGTTGC	GAAAAAATTC	240
CCACATCGTC	ATCGTAAAGA	TGGCCGTTAC	TATGTCATCG	ACTTTACCTT	AAAAGAAATT	300
CAAAGTTTAG	AAATGACAGA	AAACTTTGAA	ACCATGGCCA	TGTTTCAGGA	CCCACAGGAG	360
CGACCCAGAA	AGTTACCACA	GTTATGCACA	GAGCTGCAAA	CAACTATACA	TGATATAATA	420
TTAGAATGTG	TGTACTGCAA	GCAACAGTTA	CTGCGACGTG	AGGTATATGA	CTTTGCTTTT	480
CGGGATTTAT	GCATAGTATA	TAGAGATGGG	AATCCATATG	CTGTATGTGA	TAAATGTTTA	540
AAGTTTATT	CTAAAATTAG	TGAGTATAGA	CATTATTTT	ATAGTTTGTA	TGGAACAACA	600
TTAGAACAGC	AATACAACAA	ACCGTTGTGT	GATTTGTTAA	TTAGGTGTAT	TAACTGTCAA	660
AAGCCATGTG	GTCCTGAAGA	AAAGCAAAGA	CATCTGGACA	AAAAGCAAAG	ATTCCATAAT	720
ATAAGGGGTC	GGTGGACCGG	TCGATGTATG	TCTTGTGCA	GATCATCAAG	AACACGTAGA	780
GAAACCCAGC	TGACTAGTGG	CCACCATCAC	CATCACCATT	AA		822

<210> 4

<211> 273

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
16)

<400> 4

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
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Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro

	20		25		30										
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
	35		40		45										
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50		55		60										
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65			70		75										80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
			85		90										95
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
	100		105		110										
Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu	Pro	Gln	Leu
	115		120		125										
Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu	Glu	Cys	Val
	130		135		140										
Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp	Phe	Ala	Phe
145			150		155										160
Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr	Ala	Val	Cys
			165		170										175
Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr	Arg	His	Tyr
	180		185		190										
Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr	Asn	Lys	Pro
	195		200		205										
Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys	Pro	Leu	Cys
	210		215		220										
Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg	Phe	His	Asn
225			230		235										240
Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys	Arg	Ser	Ser
			245		250										255
Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Thr	Ser	Gly	His	His	His	His	His
	260		265		270										
His															

<210> 5

<211> 1116

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 16)

<400> 5

atggatccaa gcagccattc atcaaatatg gcgaatacc aaatgaaatc agacaaaatc 60
attattgctc accgtggtgc tagcgggttat ttaccagagc atacgttaga atctaaagca 120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt 180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc 240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt 300
caaagtttag aaatgacaga aaactttgaa accatggcca tgtttcagga cccacaggag 360
cgaccagaa agttaccaca gttatgcaca gagctgcaaa caactataca tgatataata 420
ttagaatgtg tgtactgcaa gcaacagtta ctgcgacgtg aggtatatga ctttgctttt 480
cgggatttat gcatagtata tagagatggg aatccatatg ctgtatgtga taaatgttta 540
aagttttatt ctaaaattag tgagtataga cattattgtt atagtttgta tggaacaaca 600
ttagaacagc aatacaacaa accgttgtgt gatttgttta ttaggtgtat taactgtcaa 660
aagccactgt gtctgaaga aaagcaaaga catctggaca aaaagcaaag attccataat 720
ataaggggtc ggtggaccgg tcgatgtatg tcttggttga gatcatcaag aacacgtaga 780
gaaaccagc tgatgcatgg agatacacct acattgcatg aatatatgtt agatttgcaa 840
ccagagacaa ctgatctcta ctgttatgag caattaaatg acagctcaga ggaggaggat 900
gaaatagatg gtccagctgg acaagcagaa ccggacagag cccattacaa tattgtaacc 960
tttggttgca agtgtgactc tacgcttcgg ttgtggttac aaagcacaca cgtagacatt 1020
cgtactttgg aagacctgtt aatgggcaca ctaggattg tgtgccccat ctgttctcag 1080
aaaccaacta gtggccacca tcaccatcac catta 1116

<210> 6

<211> 371

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6E7 fusion from Human papilloma
virus type 16)

<400> 6

Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
1 5 10 15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
20 25 30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
35 40 45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
50 55 60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65 70 75 80

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 7

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attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca     120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt     180
cgtttagtgg ttattcaaga tcacttttta gatggcttga ctgatgttgc gaaaaaattc     240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt     300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggaga tacacctaca     360
ttgcatgaat atatgttaga ttgtcaacca gagacaactg atctctacgg ttatcagcaa     420
ttaaatagaca gctcagagga ggaggatgaa atagatggtc cagctggaca agcagaaccg     480
gacagagccc attacaatat tgtaaccttt tgttgcaagt gtgactctac gcttcggttg     540
tgcgtaaaaa gcacacacgt agacattcgt actttggaag acctgttaat gggcacacta     600
ggaattgtgt gcccacatctg ttctcagaaa ccaactagtg gccaccatca ccatcaccat     660
taa                                                                    663
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<210> 8

<211> 220

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 16)

<400> 8

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1          5          10          15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
          20          25          30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
          35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
          50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65          70          75          80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
          85          90          95
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<210> 10
<211> 292
<212> PRT
<213> ChArtificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus
pneumoniae and E6 from Human papilloma virus type
16)

<400> 10

Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
1 5 10 15
Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
20 25 30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
35 40 45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
50 55 60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
65 70 75 80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
85 90 95
Val Ser Asn Ala Phe Ile Gln Ser Ala Asp Gly Thr Gly Trp Tyr Tyr
100 105 110
Leu Lys Pro Asp Gly Thr Leu Ala Asp Arg Pro Glu Leu Ala Ser Met
115 120 125
Leu Asp Met Ala Met Phe Gln Asp Pro Gln Glu Arg Pro Arg Lys Leu
130 135 140
Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp Ile Ile Leu
145 150 155 160
Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu Val Tyr Asp
165 170 175
Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly Asn Pro Tyr
180 185 190
Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile Ser Glu Tyr
195 200 205
Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu Gln Gln Tyr
210 215 220
Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn Cys Gln Lys
225 230 235 240
Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys Lys Gln Arg

	245	250	255
Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met Ser Cys Cys			
	260	265	270
Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu Thr Ser Gly His His			
	275	280	285
His His His His			
290			

<210> 11
 <211> 720
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E7 from Human papilloma virus type
 16)

<400> 11

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aatggcactt ggtactactt tgacagttca ggctatatgc ttgcagaccg ctggaggaag	120
cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag	180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc	240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaattgcc	300
tttatccagt cagcggacgg aacaggctgg tactactca aaccagacgg aacactggca	360
gacaggccag aattggccag catgctggac atggccatgc atggagatac acctacattg	420
catgaatata tgtagattt gcaaccagag acaactgata tctactgtta tgagcaatta	480
aatgacagct cagaggagga ggatgaaata gatggtccag ctggacaagc agaaccggac	540
agagccatt acaatattgt aaccttttgt tccaagtgtg actctacgt tgggttgtgc	600
gtacaaagca cacacgtaga cattcgtagt ttggaagacc tggtaattggg cacactagga	660
attgtgtgcc ccatctgttc tcagaaacca actagtggcc accatcacca tcaccattaa	720

<210> 12
 <211> 239
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (Clyta from Streptococcus
 pneumoniae and E7 from Human papilloma virus type
 16)

<400> 12

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Phe	Glu	Lys	Ile	Asn	Gly	Thr	Trp	Tyr	Tyr	Phe	Asp	Ser	Ser	Gly	Tyr
			20					25					30		
Met	Leu	Ala	Asp	Arg	Trp	Arg	Lys	His	Thr	Asp	Gly	Asn	Trp	Tyr	Trp
		35					40					45			
Phe	Asp	Asn	Ser	Gly	Glu	Met	Ala	Thr	Gly	Trp	Lys	Lys	Ile	Ala	Asp
	50					55					60				
Lys	Trp	Tyr	Tyr	Phe	Asn	Glu	Glu	Gly	Ala	Met	Lys	Thr	Gly	Trp	Val
65					70					75				80	
Lys	Tyr	Lys	Asp	Thr	Trp	Tyr	Tyr	Leu	Asp	Ala	Lys	Glu	Gly	Ala	Met
			85					90					95		
Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr
		100						105					110		
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met
	115						120				125				
Leu	Asp	Met	Ala	Met	His	Gly	Asp	Thr	Pro	Thr	Leu	His	Glu	Tyr	Met
	130					135					140				
Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp	Leu	Tyr	Cys	Tyr	Glu	Gln	Leu
145				150						155				160	
Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu	Ile	Asp	Gly	Pro	Ala	Gly	Gln
			165						170					175	
Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn	Ile	Val	Thr	Phe	Cys	Cys	Lys
		180						185					190		
Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val	Gln	Ser	Thr	His	Val	Asp	Ile
	195						200					205			
Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly	Thr	Leu	Gly	Ile	Val	Cys	Pro
	210					215					220				
Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly	His	His	His	His	His	His	His
225				230							235				

<210> 13

<211> 1173

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (Clyta from Streptococcus pneumoniae and E6E7 fusion from Human papilloma virus type 16)

<400> 13

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aatggcactt ggtactactt tgacagttca ggctatatgc ttgcagaccg ctggaggaag 120
cacacagacg gcaactggta ctggttcgac aactcaggcg aaatggctac aggctggaag 180
aaaatcgctg ataagtggta ctatttcaac gaagaagggtg ccatgaagac aggctgggtc 240
aagtacaagg acacttggta ctacttagac gctaaagaag gcgccatggt atcaaatgcc 300
tttatccagt cagcggacgg aacaggctgg tactacctca aaccagacgg aacactggca 360
gacaggccag aattggccag catgctggac atggccatgt ttcaggaccc acaggagcga 420
cccagaaagt taccacagtt atgcacagag ctgcaacaaa ctatacatga tataatatta 480
gaatgtgtgt actgcaagca acagttactg cgacgtgagg tatatgactt tgcttttcgg 540
gatttatgca tagtatatag agatgggaat ccatatgctg tatgtgataa atgtttaaag 600
ttttattcta aaattagtga gtatagacat tattgttata gtttgtatgg aacaacatta 660
gaacagcaat acaacaaacc gttgtgtgat ttgttaatta ggtgtattaa ctgtcaaaag 720
ccactgtgtc ctgaagaaaa gcaaagacat ctggacaaaa agcaaagatt ccataatata 780
aggggtcggg ggaccggtcg atgtatgtct tgttgccgat catcaagaac acgtagagaa 840
accagctga tgcattggaga tacacctaca ttgcatgaat atatgttaga tttgcaacca 900
gagacaactg atctctactg ttatgagcaa ttaaattgaca gctcagagga ggaggatgaa 960
atagatggtc cagctggaca agcagaaccg gacagagccc attacaatat tgtaaccttt 1020
tggtgcaagt gtgactctac gcttcgggtg tgcgtacaaa gcacacacgt agacattcgt 1080
actttggaag acctgttaat gggcacacta ggaattgtgt gccccatctg ttctcagaaa 1140
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<210> 14

<211> 390

<212> PRT

<213> Artificial Sequence

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<220>

<223> Chimaeric protein (Clyta from Streptococcus
pneumoniae and E6E7 fusion from Human papilloma
virus type 16)

<400> 14

Met Lys Gly Gly Ile Val His Ser Asp Gly Ser Tyr Pro Lys Asp Lys
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Phe Glu Lys Ile Asn Gly Thr Trp Tyr Tyr Phe Asp Ser Ser Gly Tyr
20 25 30
Met Leu Ala Asp Arg Trp Arg Lys His Thr Asp Gly Asn Trp Tyr Trp
35 40 45
Phe Asp Asn Ser Gly Glu Met Ala Thr Gly Trp Lys Lys Ile Ala Asp
50 55 60
Lys Trp Tyr Tyr Phe Asn Glu Glu Gly Ala Met Lys Thr Gly Trp Val
65 70 75 80
Lys Tyr Lys Asp Thr Trp Tyr Tyr Leu Asp Ala Lys Glu Gly Ala Met
85 90 95

Val	Ser	Asn	Ala	Phe	Ile	Gln	Ser	Ala	Asp	Gly	Thr	Gly	Trp	Tyr	Tyr			
			100						105					110				
Leu	Lys	Pro	Asp	Gly	Thr	Leu	Ala	Asp	Arg	Pro	Glu	Leu	Ala	Ser	Met			
			115					120					125					
Leu	Asp	Met	Ala	Met	Phe	Gln	Asp	Pro	Gln	Glu	Arg	Pro	Arg	Lys	Leu			
			130					135					140					
Pro	Gln	Leu	Cys	Thr	Glu	Leu	Gln	Thr	Thr	Ile	His	Asp	Ile	Ile	Leu			
			145				150					155			160			
Glu	Cys	Val	Tyr	Cys	Lys	Gln	Gln	Leu	Leu	Arg	Arg	Glu	Val	Tyr	Asp			
					165					170				175				
Phe	Ala	Phe	Arg	Asp	Leu	Cys	Ile	Val	Tyr	Arg	Asp	Gly	Asn	Pro	Tyr			
			180					185					190					
Ala	Val	Cys	Asp	Lys	Cys	Leu	Lys	Phe	Tyr	Ser	Lys	Ile	Ser	Glu	Tyr			
			195					200					205					
Arg	His	Tyr	Cys	Tyr	Ser	Leu	Tyr	Gly	Thr	Thr	Leu	Glu	Gln	Gln	Tyr			
			210					215					220					
Asn	Lys	Pro	Leu	Cys	Asp	Leu	Leu	Ile	Arg	Cys	Ile	Asn	Cys	Gln	Lys			
			225				230				235			240				
Pro	Leu	Cys	Pro	Glu	Glu	Lys	Gln	Arg	His	Leu	Asp	Lys	Lys	Gln	Arg			
					245					250				255				
Phe	His	Asn	Ile	Arg	Gly	Arg	Trp	Thr	Gly	Arg	Cys	Met	Ser	Cys	Cys			
			260					265					270					
Arg	Ser	Ser	Arg	Thr	Arg	Arg	Glu	Thr	Gln	Leu	Met	His	Gly	Asp	Thr			
			275					280					285					
Pro	Thr	Leu	His	Glu	Tyr	Met	Leu	Asp	Leu	Gln	Pro	Glu	Thr	Thr	Asp			
			290				295					300						
Leu	Tyr	Cys	Tyr	Glu	Gln	Leu	Asn	Asp	Ser	Ser	Glu	Glu	Glu	Asp	Glu			
			305				310				315			320				
Ile	Asp	Gly	Pro	Ala	Gly	Gln	Ala	Glu	Pro	Asp	Arg	Ala	His	Tyr	Asn			
					325					330				335				
Ile	Val	Thr	Phe	Cys	Cys	Lys	Cys	Asp	Ser	Thr	Leu	Arg	Leu	Cys	Val			
			340					345					350					
Gln	Ser	Thr	His	Val	Asp	Ile	Arg	Thr	Leu	Glu	Asp	Leu	Leu	Met	Gly			
			355				360					365						
Thr	Leu	Gly	Ile	Val	Cys	Pro	Ile	Cys	Ser	Gln	Lys	Pro	Thr	Ser	Gly			
			370				375					380						
His	His	His	His	His	His													
			385				390											

<210> 15

<211> 684

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 15

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atggatccaa gcagccattc atcaaatatg gcgaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtggtgc tagcggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaatc      240
ccacatcgtc atcgtaaaga tggccgttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca tttagagccc caaatgaaa ttccggttga ctttctatgt      420
cacgagcaat taagcgactc agaggaagaa aacgatgaaa tagatgaagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag      600
cagctgtttc tgaacacctt gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaccatc accatcacca ttaa                                           684
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<210> 16

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E7 from Human papilloma virus type
18)

<400> 16

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1              5              10              15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
      20              25              30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
      35              40              45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
      50              55              60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
65              70              75              80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
      85              90              95
```

Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Met
 100 105 110
 Ala Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu
 115 120 125
 Glu Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu
 130 135 140
 Ser Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Glu Val Asn His Gln
 145 150 155 160
 His Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys
 165 170 175
 Met Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser
 180 185 190
 Ala Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser
 195 200 205
 Phe Val Cys Pro Trp Cys Ala Ser Gln Gln Thr Ser Gly His His His
 210 215 220
 His His His
 225

<210> 17
 <211> 109
 <212> PRT
 <213> Escherichia coli

<400> 17
 Met Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
 1 5 10 15
 Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
 20 25 30
 Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp
 35 40 45
 Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
 50 55 60
 Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
 65 70 75 80
 Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
 85 90 95
 Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala
 100 105

<210> 18
 <211> 684
 <212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 18)

<400> 18

```
atggatccaa gcagccattc atcaaatatg gccaataccc aaatgaaatc agacaaaatc      60
attattgctc accgtgggtgc tagcgggttat ttaccagagc atacgttaga atctaaagca      120
cttgcgtttg cacaacaggc tgattattta gagcaagatt tagcaatgac taaggatggt      180
cgtttagtgg ttattcacga tcacttttta gatggcttga ctgatgttgc gaaaaaattc      240
ccacatcgtc atcgtaaaga tggccggttac tatgtcatcg actttacctt aaaagaaatt      300
caaagtttag aaatgacaga aaactttgaa accatggcca tgcattggacc taaggcaaca      360
ttgcaagaca ttgtattgca tttagagccc caaaatgaaa ttccggttga ccttctaggt      420
caccagcaat taagcgactc agaggaagaa aacgatgaaa tagatggagt taatcatcaa      480
catttaccag cccgacgagc cgaaccacaa cgtcacacaa tgttgtgtat gtgttgtaag      540
tgtgaagcca gaattgagct agtagtagaa agctcagcag acgaccttcg agcattccag      600
cagctgtttc tgaacaccct gtcctttgtg tgtccgtggt gtgcatccca gcagactagt      660
ggccaccatc accatcacca ttaa                                     684
```

<210> 19

<211> 227

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and mutated E7 from Human papilloma
virus type 18)

<400> 19

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Met Asp Pro Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
 1           5           10          15
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
 20          25          30
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
 35          40          45
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
 50          55          60
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
 65          70          75          80
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
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85					90					95						
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met	
100					105					110						
Ala	Met	His	Gly	Pro	Lys	Ala	Thr	Leu	Gln	Asp	Ile	Val	Leu	His	Leu	
115					120					125						
Glu	Pro	Gln	Asn	Glu	Ile	Pro	Val	Asp	Leu	Leu	Gly	His	Gln	Gln	Leu	
130					135					140						
Ser	Asp	Ser	Glu	Glu	Glu	Asn	Asp	Glu	Ile	Asp	Gly	Val	Asn	His	Gln	
145					150					155					160	
His	Leu	Pro	Ala	Arg	Arg	Ala	Glu	Pro	Gln	Arg	His	Thr	Met	Leu	Cys	
165					170					175						
Met	Cys	Cys	Lys	Cys	Glu	Ala	Arg	Ile	Glu	Leu	Val	Val	Glu	Ser	Ser	
180					185					190						
Ala	Asp	Asp	Leu	Arg	Ala	Phe	Gln	Gln	Leu	Phe	Leu	Asn	Thr	Leu	Ser	
195					200					205						
Phe	Val	Cys	Pro	Trp	Cys	Ala	Ser	Gln	Gln	Thr	Ser	Gly	His	His	His	
210					215					220						
His His His																
225																

<210> 20

<211> 837

<212> DNA

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza virus B and E6 from Human papilloma virus type 18)

<400> 20

atggatccaa	gcagccattc	atcaaatatg	gcgaatacce	aatgaaatc	agacaaaatc	60
attattgctc	accgtggtgc	tagcgggtat	ttaccgagagc	atacgttaga	atctaaagca	120
cttgcgtttg	cacaacaggc	tgattattta	gagcaagatt	tagcaatgac	taaggatggt	180
cgttttagtgg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccgttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagttag	aatgacaga	aaactttgaa	acgatggcgc	gctttgagga	tccaacacgg	360
cgaccctaca	agctacctga	tctgtgcacg	gaactgaaca	cttactgca	agacatagaa	420
ataacctgtg	tatattgcaa	gacagtattg	gaacttacag	aggtatttga	atttgcattt	480
aaagatttat	ttgtggtgta	tagagacagt	ataccgcatg	ctgcatgcca	taaatgtata	540
gatttttatt	ctagaattag	agaattaaga	cattattcag	actctgtgta	tggagacaca	600
ttggaaaaac	taactaacac	tgggttatac	aattttattaa	taagggtgcct	gcggtgccag	660
aaaccgttga	atccagcaga	aaaacttaga	caccttaatg	aaaaacgacg	atttcacaac	720

atagctgggc actatagagg ccagtgccat tctgtctgca accgagcacg acaggaacga
ctccaacgac gcagagaaac acaagtaact agtggccacc atcaccatca ccattaa

780

837

<210> 21

<211> 278

<212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus
influenza B and E6 from Human papilloma virus type
18)

<400> 21

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
1				5				10					15		
Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
			35					40					45		
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
			50				55				60				
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65					70					75					80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
				85					90					95	
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Arg	Phe	Glu	Asp	Pro	Thr	Arg	Arg	Pro	Tyr	Lys	Leu	Pro	Asp	Leu
			115					120					125		
Cys	Thr	Glu	Leu	Asn	Thr	Ser	Leu	Gln	Asp	Ile	Glu	Ile	Thr	Cys	Val
			130				135						140		
Tyr	Cys	Lys	Thr	Val	Leu	Glu	Leu	Thr	Glu	Val	Phe	Glu	Phe	Ala	Phe
145					150					155					160
Lys	Asp	Leu	Phe	Val	Val	Tyr	Arg	Asp	Ser	Ile	Pro	His	Ala	Ala	Cys
				165					170					175	
His	Lys	Cys	Ile	Asp	Phe	Tyr	Ser	Arg	Ile	Arg	Glu	Leu	Arg	His	Tyr
			180					185					190		
Ser	Asp	Ser	Val	Tyr	Gly	Asp	Thr	Leu	Glu	Lys	Leu	Thr	Asn	Thr	Gly
			195					200					205		
Leu	Tyr	Asn	Leu	Leu	Ile	Arg	Cys	Leu	Arg	Cys	Gln	Lys	Pro	Leu	Asn
			210				215						220		
Pro	Ala	Glu	Lys	Leu	Arg	His	Leu	Asn	Glu	Lys	Arg	Arg	Phe	His	Asn

225		230		235		240									
Ile	Ala	Gly	His	Tyr	Arg	Gly	Gln	Cys	His	Ser	Cys	Cys	Asn	Arg	Ala
		245		250		255									
Arg	Gln	Glu	Arg	Leu	Gln	Arg	Arg	Arg	Glu	Thr	Gln	Val	Thr	Ser	Gly
		260		265		270									
His	His	His	His	His	His										
		275													

<210> 22
 <211> 1152
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Chimaeric protein (protein D from Haemophilus
 influenza B and E6E7 fusion from Human papilloma
 virus type 18)

<400> 22

atggatccaa	gcagccattc	atcaaatatg	gcgaataccc	aatgaaatc	agacaaaatc	60
attattgctc	accgtggtgc	tagcggttat	ttaccagagc	atacgttaga	atctaaagca	120
cttgcgtttg	cacaacaggc	tgattattta	gagcaagatt	tagcaatgac	taaggatggt	180
cgtttagtgg	ttattcacga	tcacttttta	gatggcttga	ctgatgttgc	gaaaaaattc	240
ccacatcgtc	atcgtaaaga	tggccgttac	tatgtcatcg	actttacctt	aaaagaaatt	300
caaagtttag	aatgacaga	aaactttgaa	accatggcgc	gctttgagga	tccaacacgg	360
cgaccctaca	agctacctga	tctgtgcacg	gaactgaaca	cttactgca	agacatagaa	420
ataacctgtg	tatattgcaa	gacagtattg	gaacttacag	aggtatttga	atttgcattt	480
aaagatttat	ttgtggtgta	tagagacagt	atccgcatg	ctgeatgcca	taaatgtata	540
gattttttatt	ctagaattag	agaattaaga	cattattcag	actctgtgta	tggagacaca	600
ttggaaaaac	taactaacac	tgggttatac	gatttattaa	taaggtgcct	gcggtgccag	660
aaaccgttga	atccagcaga	aaaacttaga	cacottaatg	aaaaacgacg	atttcacaac	720
atagctgggc	actatagagg	ccagtgccat	tctgtctgca	accgagcacg	acaggaacga	780
ctccaacgac	gcagagaaac	acaagtaatg	catggacctt	aggcaacatt	gcaagacatt	840
gtattgcatt	tagagcccca	aatgaaatt	ccggttgacc	ttctatgtca	cgagcaatta	900
agcgactcag	aggaagaaaa	cgatgaaata	gatggagtta	atcatcaaca	tttaccagcc	960
cgacgagccg	aaccacaacg	tcacacaatg	ttgtgtatgt	gttgtaagtg	tgaagccaga	1020
attgagctag	tagtagaaag	ctcagcagac	gaccttcgag	cattccagca	gctgtttctg	1080
aacaccctgt	cctttgtgtg	tccgtggtgt	gcaccccgag	agactagtgg	ccaccatcac	1140
catcaccatt	aa					1152

<210> 23
 <211> 383
 <212> PRT

<213> Artificial Sequence

<220>

<223> Chimaeric protein (protein D from Haemophilus influenza B and E6E7 fusion from Human papilloma virus type 18)

<400> 23

Met	Asp	Pro	Ser	Ser	His	Ser	Ser	Asn	Met	Ala	Asn	Thr	Gln	Met	Lys
1				5					10					15	
Ser	Asp	Lys	Ile	Ile	Ile	Ala	His	Arg	Gly	Ala	Ser	Gly	Tyr	Leu	Pro
			20					25					30		
Glu	His	Thr	Leu	Glu	Ser	Lys	Ala	Leu	Ala	Phe	Ala	Gln	Gln	Ala	Asp
		35					40					45			
Tyr	Leu	Glu	Gln	Asp	Leu	Ala	Met	Thr	Lys	Asp	Gly	Arg	Leu	Val	Val
	50					55					60				
Ile	His	Asp	His	Phe	Leu	Asp	Gly	Leu	Thr	Asp	Val	Ala	Lys	Lys	Phe
65					70					75					80
Pro	His	Arg	His	Arg	Lys	Asp	Gly	Arg	Tyr	Tyr	Val	Ile	Asp	Phe	Thr
				85				90					95		
Leu	Lys	Glu	Ile	Gln	Ser	Leu	Glu	Met	Thr	Glu	Asn	Phe	Glu	Thr	Met
			100					105					110		
Ala	Arg	Phe	Glu	Asp	Pro	Thr	Arg	Arg	Pro	Tyr	Lys	Leu	Pro	Asp	Leu
		115					120					125			
Cys	Thr	Glu	Leu	Asn	Thr	Ser	Leu	Gln	Asp	Ile	Glu	Ile	Thr	Cys	Val
	130					135					140				
Tyr	Cys	Lys	Thr	Val	Leu	Glu	Leu	Thr	Glu	Val	Phe	Glu	Phe	Ala	Phe
145					150					155				160	
Lys	Asp	Leu	Phe	Val	Val	Tyr	Arg	Asp	Ser	Ile	Pro	His	Ala	Ala	Cys
			165					170					175		
His	Lys	Cys	Ile	Asp	Phe	Tyr	Ser	Arg	Ile	Arg	Glu	Leu	Arg	His	Tyr
		180						185					190		
Ser	Asp	Ser	Val	Tyr	Gly	Asp	Thr	Leu	Glu	Lys	Leu	Thr	Asn	Thr	Gly
	195						200					205			
Leu	Tyr	Asn	Leu	Leu	Ile	Arg	Cys	Leu	Arg	Cys	Gln	Lys	Pro	Leu	Asn
	210					215					220				
Pro	Ala	Glu	Lys	Leu	Arg	His	Leu	Asn	Glu	Lys	Arg	Arg	Phe	His	Asn
225				230						235				240	
Ile	Ala	Gly	His	Tyr	Arg	Gly	Gln	Cys	His	Ser	Cys	Cys	Asn	Arg	Ala
			245					250					255		
Arg	Gln	Glu	Arg	Leu	Gln	Arg	Arg	Arg	Glu	Thr	Gln	Val	Met	His	Gly
		260					265					270			
Pro	Lys	Ala	Thr	Leu	Gln	Asp	Ile	Val	Leu	His	Leu	Glu	Pro	Gln	Asn

275	280	285
Glu Ile Pro Val Asp Leu Leu Cys His	Glu Gln Leu Ser Asp Ser Glu	
290	295	300
Glu Glu Asn Asp Glu Ile Asp Gly Val	Asn His Gln His Leu Pro Ala	
305	310	315
Arg Arg Ala Glu Pro Gln Arg His Thr	Met Leu Cys Met Cys Cys Lys	
325	330	335
Cys Glu Ala Arg Ile Glu Leu Val Val	Glu Ser Ser Ala Asp Asp Leu	
340	345	350
Arg Ala Phe Gln Gln Leu Phe Leu Asn	Thr Leu Ser Phe Val Cys Pro	
355	360	365
Trp Cys Ala Ser Gln Gln Thr Ser Gly	His His His His His His	
370	375	380

<210> 24
 <211> 20
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 24
 tccatgacgt tcttgacgtt

20

<210> 25
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 25
 tctcccagcg tgcgccat

18

<210> 26
 <211> 30
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic

<400> 26

accgatgacg tcgccggtga cggcaccacg

30